AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

Listing of Claims

Claim 1 (Currently Amended): A signal encoding apparatus configured to quantize an input signal, to encode the input signal quantized, and then to output the input signal encoded as an output signal, the signal encoding apparatus comprising:

a quantizer configured to quantize the input signal of a predetermined block based on a plurality of quantization methods and to generate a plurality of quantized signals;

a dequantizer configured to obtain a plurality of decoded signals by respectively dequantizing a~~ the plurality of ~~input~~ quantized signals ~~which are quantized by the quantizer~~;

an error signal calculator configured to calculate a plurality of error signals of the predetermined block ,each of which indicates a difference between each of the plurality of decoded signals and the input signal;

a weight calculator configured to calculate, for respective short blocks included in the predetermined block, weights negatively-correlated with frequency power spectrums of the input signal corresponding to the short blocks included in the predetermined block ~~a weight related to degree concerning whether or not quantization noise corresponding to an error signal of a short block which is shorter block than the predetermined block is virtually imperceptible for a user for each of short blocks included in the predetermined block~~;

a weighted error signal generator configured to weight the plurality of error signals corresponding to the short blocks respectively, by using the weights calculated by the weight calculator, and to generate a plurality of weighted error signals;

an electric power calculator configured to calculate electric power values of the plurality of weighted error signals respectively, and

2

a quantization method selector configured to compare the electric power values of the plurality of weighted error signals with one another, and to select a quantization method from among the plurality of quantization methods based on a result of the comparison, ~~when a plurality of first weighted error signals ,each of which indicates a signal obtained by assigning a weight, corresponding to each short block included in the predetermined block, to an error signal of the short block ,are generated, to compare the plurality of first weighted error signals with one another, and to select a given quantization method from among the plurality of quantization methods based on a result of the comparison; and~~

an encoder configured to encode the input signal which is quantized based on the selected quantization method; and

an outputting unit configured, ~~when the input signal of the predetermined block is quantized based on the given quantization method and then the input signal quantized is encoded,~~ to output the input signal encoded as an output signal.

Claim 2 (Currently Amended): The signal encoding apparatus according to claim 1, wherein the short blocks include a plurality of subblocks into which the predetermined block is divided~~weight calculator calculates a weight related to degree concerning whether or not quantization noise corresponding to an error signal of each of subblocks into which the predetermined block is divided is virtually imperceptible for the user, for each subblock included in the predetermined block, and~~

~~wherein, when a plurality of first weighted error signals ,each of which indicates a signal obtained by assigning a weight, corresponding to each subblock included in the predetermined block, to an error signal of the subblock, are generated, the quantization method selector compares the plurality of first weighted error signals with one another, and~~

3

~~selects a given quantization method from among the plurality of the quantization methods~~

~~based on a result of the comparison.~~

Claim 3 (Cancelled).

Claim 4 (Original): The signal encoding apparatus according to claim 1, further

comprising:

an instructing unit configured, when a predetermined quantization method is selected

by the quantization method selector, to instruct the quantizer not to perform quantization

based on any quantization method other than the predetermined quantization method.

Claim 5 (Original): The signal encoding apparatus according to claim 1, further

comprising:

a quantization method generator configured to generate the plurality of quantization

methods based on an amount of information of encoding terms necessary for expressing the

output signal to be outputted from the output unit.

Claim 6 (Currently Amended): The signal encoding apparatus according to ~~claim~~

~~2~~claim 1, further comprising:

~~wherein the weight calculator comprises:~~

a prediction analyzer configured to calculate a plurality of linear prediction

parameters by performing a linear prediction analysis of the input signal for ~~each subblock~~

the respective short blocks included in the predetermined block~~; and~~

~~a weight generator configured to generate, for each subblock, a weight related to~~

~~degree concerning whether or not quantization noise corresponding to an error signal of the~~

~~subblock is virtually imperceptible for the user, based on the linear prediction parameters thus~~

~~calculated~~$_\lambda$

<u>wherein the calculator is configured to calculate the weights for the respective short</u>

<u>blocks, based on the linear prediction parameters calculated by the prediction analyzer.</u>

Claim 7 (Cancelled).

Claim 8 (Currently Amended): The signal encoding apparatus according to ~~claim~~

~~2~~<u>claim 1, further comprising:</u>

~~wherein the weighting calculator comprises:~~

a transformer configured to <u>perform</u> ~~subject the input signal to~~<u> a </u>linear transformation

<u>of the input signal</u> into ~~a~~ transformed ~~signal~~<u>signals</u> for <u>the respective short blocks</u>~~each of the~~

~~subblocks;~~<u> and</u>

<u>   an inverse transformer configured to perform an inverse linear transformation of the</u>

<u>weights calculated by the weight calculator,</u>

<u>   wherein the weight calculator</u> ~~a weight generator~~ <u>is</u> configured to<u> calculate the</u>

<u>weights for the respective short blocks, based on the transformed signals</u>~~generate, for each of~~

~~the subblocks, a weight related to degree concerning whether or not quantization noise~~

~~corresponding to an error signal of the subblock is virtually imperceptible for the user, based~~

~~on the transformed signal of each subblock; and~~

~~   an inverse transformer configured to perform an inverse linear transformation of each~~

~~weight thus generated.~~

Claims 9-11 (Cancelled).

Claim 12 (Currently Amended): A signal encoding method for quantizing an input signal, for encoding the input signal quantized, and then for outputting the input signal encoded as an output signal, the signal encoding method comprising:

a quantization step of quantizing the input signal of a predetermined block based on a plurality of quantization methods to generate a plurality of quantized signals;

a step of obtaining a plurality of decoded signals by respectively dequantizing ~~a~~ the plurality of quantized signals;

a step of calculating a plurality of error signals of the predetermined block ,each of which indicates a difference between each of the plurality of decoded signals and the input signal;

a weight calculation step of calculating, for respective short blocks included in the predetermined block, weights negatively-correlated with frequency power spectrums of the input signal corresponding to the short blocks included in the predetermined block ~~a weight related to degree concerning whether or not quantization noise corresponding to an error signal of a short block which is shorter block than the predetermined block is virtually imperceptible for a user for each of short blocks included in the predetermined block~~;

a weighting step of weighting the plurality of error signals corresponding to the short blocks respectively, by using the weights calculated by the weight calculation step, and generating a plurality of weighted error signals;

an electric power calculation step of calculating electric power values of the plurality of weighted error signals respectively, and

a first selection step of comparing the electric power values of the plurality of weighted error signals with one another, and of selecting a quantization method from among the plurality of quantization methods based on a result of the comparing the electric power values, ~~when a plurality of first weighted error signals ,each of which indicates a signal~~

~~obtained by assigning a weight, corresponding to each short block included in the~~

~~predetermined block, to an error signal of the short block ,are generated, to compare the~~

~~plurality of first weighted error signals with one another, and to select a given quantization~~

~~method from among the plurality of quantization methods based on a result of the~~

~~comparison; and~~

an encoding step of encoding the input signal which is quantized based on the selected

quantization method; and

a step_,~~when the input signal of the predetermined block is quantized based on the~~

~~given quantization method and then the input signal quantized is encoded,~~ of outputting the

input signal encoded as an output signal.

Claim 13 (Currently Amended): The signal encoding method according to claim 12,

wherein the short blocks include a plurality of subblocks into which the

predetermined block is divided~~the weight calculation step comprises a step of calculating, a~~

~~weight related to degree concerning whether or not quantization noise corresponding to an~~

~~error signal of each of subblocks into which the predetermined block is divided is virtually~~

~~imperceptible for the user, for each subblock included in the predetermined block, and~~

~~_____wherein, when a plurality of first weighted error signals ,each of which indicates a~~

~~signal obtained by assigning a weight, corresponding to each subblock included in the~~

~~predetermined block, to an error signal of the subblock, are generated, the first selection step~~

~~comprises a step of comparing the plurality of first weighted error signals with one another,~~

~~and selects a given quantization method from among the plurality of the quantization~~

~~methods based on a result of the comparison.~~

Claim 14 (Cancelled).

Claim 15 (Original): The signal encoding method according to claim 12, further comprising:

a step of instructing a unit configured to perform the quantization step so as not to perform quantization based on any quantization method other than a predetermined quantization method, when the predetermined quantization method is selected in the first selection step.

Claim 16 (Original): The signal encoding method according to claim 12, further comprising:

a step of generating the plurality of quantization methods based on an amount of information of encoding terms necessary for expressing the output signal to be outputted.

Claim 17 (Currently Amended): The signal encoding method according to ~~claim 13,~~claims 12, further comprising:

~~wherein the weight calculation step comprises:~~

a step of calculating a plurality of linear prediction parameters by performing a linear prediction analysis of the input signal for ~~each of the subblocks~~the respective short subblocks included in the predetermined block~~; and~~

~~a step of generating, for each subblock, a weight related to degree concerning whether or not quantization noise corresponding to an error signal of the subblock is virtually imperceptible for the user, based on the linear prediction parameters thus calculated,~~

wherein the step of calculating calculates the weights for the respective short blocks, based on the linear prediction parameters calculated by said calculating the linear prediction analysis.

Claim 18 (Cancelled).

Claim 19 (Currently Amended): The signal encoding method according to ~~claim 13~~claim 12, further comprising:

~~wherein the weight calculation step comprises:~~

a step of ~~subjecting the input signal to~~performing a linear transformation of the input signal into ~~a~~transformed ~~signal~~signals for ~~each of the subblock~~the respective short blocks; and

        a step of reverse transforming to perform an inverse linear transformation of the weights calculated by the weight calculating step,

        wherein the weight calculating step calculates the weights for respective short blocks, based on the transformed signals

        ~~a step of generating, for each of the subblocks, a weight related to degree concerning whether or not quantization noise corresponding to an error signal of the subblock is virtually imperceptible for the user, based on the transformed signal of each subblock; and~~

        ~~a step of performing an inverse linear transformation of each weight thus generated.~~

Claims 20-22 (Cancelled).

Claim 23 (Currently Amended): A computer readable recording medium having a program stored thereon for performing quantization of an input signal,

for encoding the quantized input signal, and then for outputting the encoded input signal as an

output signal, the program causing a computer to execute processing comprising:

a quantization step of quantizing the input signal of a predetermined block based on a

plurality of quantization methods to generate a plurality of quantized signals;

a step of obtaining a plurality of decoded signals by respectively dequantizing a the

plurality of quantized signals;

a step of calculating a plurality of error signals of the predetermined block ,each of

which indicates a difference between each of the plurality of decoded signals and the input

signal;

a weight calculation step of calculating, for respective short blocks included in the

predetermined block, weights negatively-correlated with frequency power spectrums of the

input signal corresponding to the short blocks included in the predetermined block a weight

related to degree concerning whether or not quantization noise corresponding to an error

signal of a short block which is shorter block than the predetermined block is virtually

imperceptible for a user for each of short blocks included in the predetermined block;

a weighting step of weighting the plurality of error signals corresponding to the short

blocks respectively, by using the weights calculated by the weight calculation step, and

generating a plurality of weighted error signals;

an electric power calculation step of calculating electric power values of the plurality

of weighted error signals respectively, and

a first selection step of comparing the electric power values of the plurality of

weighted error signals with one another, and of selecting a quantization method from among

the plurality of quantization methods based on a result of the comparing the electric power

values, when a plurality of first weighted error signals ,each of which indicates a signal

obtained by assigning a weight, corresponding to each short block included in the

predetermined block, to an error signal of the short block ,are generated, to compare the

plurality of first weighted error signals with one another, and to select a given quantization

~~method from among the plurality of quantization methods based on a result of the~~

~~comparison; and~~

an encoding step of encoding the input signal which is quantized based on the selected

quantization method; and

a step~~,~~ ~~, when the input signal of the predetermined block is quantized based on the~~

~~given quantization method and then the input signal quantized is encoded,~~ of outputting the

input signal encoded as an output signal.

Claim 24 (Currently Amended): The computer readable recording medium ~~program~~

according to claim 23, wherein

the short blocks include a plurality of subblocks into which the predetermined block is

divided~~wherein the weight calculation step comprises a step of calculating, a weight related~~

~~to degree concerning whether or not quantization noise corresponding to an error signal of~~

~~each of subblocks into which the predetermined block is divided is virtually imperceptible for~~

~~the user, for each subblock included in the predetermined block, and~~

~~wherein, when a plurality of first weighted error signals ,each of which indicates a~~

~~signal obtained by assigning a weight, corresponding to each subblock included in the~~

~~predetermined block, to an error signal of the subblock, are generated, the first selection step~~

~~comprises a step of comparing the plurality of first weighted error signals with one another,~~

~~and selects a given quantization method from among the plurality of the quantization~~

~~methods based on a result of the comparison.~~

Claim 25 (Cancelled).

Claim 26 (Currently Amended): The <u>computer readable recording medium</u> ~~program~~ according to claim 23,

wherein the program causes the computer to execute processing further comprising

a step of instructing a unit configured to perform the quantization step so as not to perform quantization based on any quantization method other than a predetermined quantization method, when the predetermined quantization method is selected in the first selection step.

Claim 27 (Currently Amended): The <u>computer readable recording medium</u>~~program~~ according to claim 23, the program causing the computer to execute processing further comprising

a step of generating the plurality of quantization methods based on an amount of information of encoding terms necessary for expressing the output signal to be outputted.

Claim 28 (Currently Amended): The <u>computer readable recording medium</u> ~~program~~ according to <u>claims 23, further comprising:</u>~~claim 24,~~

~~wherein the weight calculation step comprises:~~

a step of calculating <u>a plurality of</u> linear prediction parameters by performing a linear prediction analysis of the input signal for ~~each of the subblocks~~ <u>the respective short subblocks</u> <u>included</u> in the predetermined block~~; and~~

~~a step of generating, for each subblock, a weight related to degree concerning whether or not quantization noise corresponding to an error signal of the subblock is virtually imperceptible for the user, based on the linear prediction parameters thus calculated.~~

12

wherein the step of calculating calculates the weights for the respective short blocks, based

on the linear prediction parameters calculated by said calculating the linear prediction

analysis.

Claim 29 (Cancelled).

Claim 30 (Currently Amended): The computer readable recording medium program

according to claim 13, further comprising:claim 24,

wherein the weight calculation step comprises:

a step of subjecting the input signal toperforming a linear transformation of the input signal

into a transformed signal signals for each of the subblockthe respective short blocks; and

a step of reverse transforming to perform an inverse linear transformation of the

weights calculated by the weight calculating step,

wherein the weight calculating step calculates the weights for respective short blocks,

based on the transformed signals

a step of generating, for each of the subblocks, a weight related to degree concerning

whether or not quantization noise corresponding to an error signal of the subblock is virtually

imperceptible for the user, based on the transformed signal of each subblock; and

a step of performing an inverse linear transformation of each weight thus generated.

Claims 31-33 (Cancelled).

Claim 34 (New): A signal encoding apparatus configured to quantize an input signal,

to encode the input signal quantized, and then to output the input signal encoded as an output

signal, the signal encoding apparatus comprising:

13

a quantizer configured to quantize the input signal of a predetermined block based on a plurality of quantization methods and to generate a plurality of quantized signals;

a dequantizer configured to obtain a plurality of decoded signals by respectively dequantizing the plurality of quantized signals;

an error signal calculator configured to calculate a plurality of error signals of the predetermined block, each of which indicates a difference between each of the plurality of decoded signals and the input signal;

a weight calculator configured to calculate, for the predetermined block, a weight negatively-correlated with frequency power spectrums of the input signal corresponding to short blocks included in the predetermined block;

a weighted error signal generator configured to weight the plurality of error signals corresponding to the predetermined block, by using the weight calculated by the weight calculator, and to generate a plurality of weighted error signals;

an electric power calculator configured to calculate electric power values of the plurality of weighted error signals respectively;

a quantization method selector configured to compare the electric power values of the plurality of weighted error signals with one another, and to select a quantization method from among the plurality of the quantization methods based on a result of the comparison;

an encoder configured to encode the input signal which is quantized based on the selected quantization method; and

an outputting unit configured to output the input signal encoded as an output signal.

Claim 35 (New): The signal encoding apparatus according to claim 34, further comprising:

a prediction analyzer configured to calculate a plurality of linear prediction

parameters by performing a linear prediction analysis of the input signal for ~~respectively~~ the

respective short blocks in the predetermined block;

an average calculator configured to calculate an average of the plurality of linear

prediction parameters calculated by the prediction analyzer, the average corresponding to the

predetermined block; and

a weighting prediction parameter calculator configured to calculate a weighting linear

prediction parameter corresponding to the predetermined block, based on the average

calculated by the average calculator,

wherein the weight calculator is configured to calculate the weight for the

predetermined block, based on the weighting linear prediction parameter calculated by the

weighting prediction parameter.

Claim 36 (New): The signal encoding apparatus according to claim 34, further

comprising:

a transformer configured to perform a linear transformation of the input signal into

transformed signals for the respective short blocks;

a transformation average value calculator configured to calculate, based on

transformed signal values which are respective values of the transformed signals, an average

of the transformation signal values, the average corresponding to the predetermined block;

and

an inverse transformer configured to perform an inverse linear transformation of the

weight calculated by the weight calculator,

wherein the weight calculator is configured to calculate the weight for the

predetermined block, based on the average of the transformation signal values.

Claim 37 (New): A signal encoding apparatus configured to quantize an input signal, to encode the input signal quantized, and then to output the input signal encoded as an output signal, the signal encoding apparatus comprising:

a quantizer configured to quantize the input signal of a predetermined block based on a plurality of quantization methods and to generate a plurality of quantized signals;

a dequantizer configured to obtain a plurality of decoded signals by respectively dequantizing the plurality of quantized signals;

an error signal calculator configured to calculate a plurality of error signals of the predetermined block, each of which indicates a difference between each of the plurality of decoded signals and the input signal;

a signal electric power value calculator configured to calculate signal electric power values indicating electric power values of the input signal for respective short blocks included in the predetermined block on a temporal axis; and

a weight calculator configured to calculate, for respective short blocks included in the predetermined block weights negatively-correlated with the calculated signal electric power values corresponding to the short blocks included in the predetermined block;

a weighted error signal generator configured to weight the plurality of error signals corresponding to the short blocks respectively, by using the weights calculated by the weight calculator, and to generate a plurality of weighted error signals;

an electric power calculator configured to calculate electric power values of the plurality of weighted error signals respectively;

a quantization method selector configured to compare the electric power values of the plurality of weighted error signals with one another, and to select a quantization method from among the plurality of the quantization methods based on a result of the comparison;

an encoder configured to encode the input signal which is quantized based on the selected quantization method; and

an outputting unit configured to output the input signal encoded as an output signal.

Claim 38 (New): A signal encoding apparatus configured to quantize an input signal, to encode the input signal quantized, and then to output the input signal encoded as an output signal, the signal encoding apparatus comprising:

a quantizer configured to quantize the input signal of a predetermined block based on a plurality of quantization methods and to generate a plurality of quantized signals;

a dequantizer configured to obtain a plurality of decoded signals by respectively dequantizing the plurality of quantized signals;

an error signal calculator configured to calculate a plurality of error signals of the predetermined block, each of which indicates a difference between each of the plurality of decoded signals and the input signal;

a signal electric power value calculator configured to calculate signal electric power values indicating electric power values of the input signal for respective short blocks included in the predetermined block on a temporal axis;

a function calculator configured to calculate, based on respective signal electric power values thus calculated, an electric power function corresponding to the predetermined block, the electric power function indicating distribution of the respective signal electric power values;

a weight calculator configured to calculate, for the predetermined block, a weight negatively-correlated with electric power function calculated by the function calculator;

an weighted error signal generator configured to weight the plurality of error signals corresponding to the predetermined block, by using the weight calculated by the weight calculator, and to generate a plurality of weighted error signals;

an electric power calculator configured to calculate electric power values of the plurality of weighted error signals respectively;

a quantization method selector configured to compare the electric power values of the plurality of weighted error signals with one another, and to select a quantization method from among the plurality of the quantization methods based on a result of the comparison;

an encoder configured to encode the input signal which is quantized based on the selected quantization method; and

an outputting unit configured to output the input signal encoded as an output signal.

Claim 39 (New): The signal encoding apparatus according to claim 34,

wherein the short blocks include a plurality of subblocks into which the predetermined block is divided.

Claim 40 (New): The signal encoding apparatus according to claim 34, further comprising:

an instructing unit configured, when a predetermined quantization method is selected by the quantization method selector, to instruct the quantizer not to perform quantization based on any quantization method other than the predetermined quantization method.

Claim 41 (New): The signal encoding apparatus according to claim 34, further comprising:

a quantization method generator configured to generate the plurality of quantization methods based on an amount of information of encoding terms necessary for expressing the output signal to be outputted from the output unit.

Claim 42 (New): The signal encoding apparatus according to claim 37,

wherein the short blocks include a plurality of subblocks into which the predetermined block is divided.

Claim 43 (New): The signal encoding apparatus according to claim 37, further comprising:

an instructing unit configured, when a predetermined quantization method is selected by the quantization method selector, to instruct the quantizer not to perform quantization based on any quantization method other than the predetermined quantization method.

Claim 44 (New): The signal encoding apparatus according to claim 37, further comprising:

a quantization method generator configured to generate the plurality of quantization methods based on an amount of information of encoding terms necessary for expressing the output signal to be outputted from the output unit.

Claim 45 (New): The signal encoding apparatus according to claim 38,

wherein the short blocks include a plurality of subblocks into which the predetermined block is divided.

Claim 46 (New): The signal encoding apparatus according to claim 38, further comprising:

an instructing unit configured, when a predetermined quantization method is selected by the quantization method selector, to instruct the quantizer not to perform quantization based on any quantization method other than the predetermined quantization method.

Claim 47 (New): The signal encoding apparatus according to claim 38, further comprising:

a quantization method generator configured to generate the plurality of quantization methods based on an amount of information of encoding terms necessary for expressing the output signal to be outputted from the output unit.